

AMENDMENTS TO THE CLAIMS

CLAIM 1 (CURRENTLY AMENDED): A planet gear carrier for a bicycle hub transmission comprising:

a first carrier member including;

a first carrier member axle opening for receiving an axle therethrough; ~~and including~~

a plurality of first planet gear openings for receiving a plurality of first planet gears

and dimensioned such that each first planet gear is entirely exposed radially; and

a first pinion pin opening at each of the plurality of first planet gear openings for

mounting a first pinion pin that rotatably supports a first planet gear;

wherein the first carrier member axle opening is structured to allow the first carrier member to rotate relative to the axle;

a separate second carrier member having a second carrier member axle opening for receiving the axle therethrough;

wherein the second carrier member axle opening is structured to allow the second carrier member to rotate relative to the axle; and

wherein the first carrier member is fastened to the second carrier member.

CLAIM 2 (ORIGINAL): The planet gear carrier according to claim 1 further comprising a coupler for nonrotatably coupling the first carrier member to the second carrier member.

CLAIM 3 (ORIGINAL): The planet gear carrier according to claim 2 wherein the coupler comprises a carrier pin that extends from a side of one of the first carrier member and the second carrier member into the side of the other one of the first carrier member and the second carrier member.

CLAIM 4 (ORIGINAL): The planet gear carrier according to claim 3 wherein the carrier pin extends from the side of the first carrier member.

CLAIM 5 (PREVIOUSLY PRESENTED): A planet gear carrier for a bicycle hub transmission comprising:

a first carrier member including a first carrier member axle opening for receiving an axle therethrough and including a plurality of first planet gear openings for receiving a plurality of first planet gears;

a separate second carrier member having a second carrier member axle opening for receiving the axle therethrough;

a carrier pin that extends from a side of one of the first carrier member and the second carrier member into a side of the other one of the first carrier member and the second carrier member to fasten the first carrier member to the second carrier member; and

wherein a debris space is formed between the first carrier member and the second carrier member surrounding the carrier pin.

CLAIM 6 (ORIGINAL): The planet gear carrier according to claim 5 wherein the first carrier member includes a recess that forms the debris space.

CLAIM 7 (PREVIOUSLY PRESENTED): A planet gear carrier for a bicycle hub transmission comprising:

a first carrier member including a first carrier member axle opening for receiving an axle therethrough and including a plurality of first planet gear openings for receiving a plurality of first planet gears;

a separate second carrier member having a second carrier member axle opening for receiving the axle therethrough;

wherein the first carrier member is fastened to the second carrier member; and

wherein the first carrier member includes a radially inwardly extending wall for axially retaining a sun gear.

CLAIM 8 (PREVIOUSLY PRESENTED): The planet gear carrier according to claim 1 further comprising:

a first pinion pin disposed in each pinion pin opening; and

a first planet gear rotatably supported on each first pinion pin.

CLAIM 9 (PREVIOUSLY PRESENTED): The planet gear carrier according to claim 1 wherein the first carrier member includes a plurality of second planet gear openings for receiving a plurality of second planet gears.

CLAIM 10 (ORIGINAL): The planet gear carrier according to claim 9 wherein the plurality of first planet gear openings is disposed on a first side of the first carrier member, and wherein the plurality of second planet gear openings are disposed on a second side of the first carrier member.

CLAIM 11 (PREVIOUSLY PRESENTED): A planet gear carrier for a bicycle hub transmission comprising:

- a first carrier member including a first carrier member axle opening for receiving an axle therethrough, wherein the first carrier member includes:

- a plurality of first planet gear openings on a first side thereof for receiving a plurality of first planet gears;

- a plurality of second planet gear openings on a second side thereof for receiving a plurality of second planet gears;

- wherein the first carrier member axle opening is structured to allow the first carrier member to rotate relative to the axle;

- a separate second carrier member having a second carrier member axle opening for receiving the axle therethrough;

- wherein the second carrier member axle opening is structured to allow the second carrier member to rotate relative to the axle;

- wherein the second carrier member is fastened to the first side of the first carrier member;

- a separate third carrier member having a third carrier member axle opening for receiving the axle therethrough;

- wherein the third carrier member axle opening is structured to allow the third carrier member to rotate relative to the axle; and

- wherein the third carrier member is fastened to the second side of the first carrier member.

CLAIM 12 (ORIGINAL): The planet gear carrier according to claim 11 further comprising:

a first coupler for nonrotatably coupling the first carrier member to the second carrier member; and

a second coupler for nonrotatably coupling the first carrier member to the third carrier member.

CLAIM 13 (ORIGINAL): The planet gear carrier according to claim 12 wherein the first coupler comprises a first carrier pin that extends from one of the first side of the first carrier member and a side of the second carrier member into the other one of the first side of the first carrier member and the side of the second carrier member, and wherein the second coupler comprises a second carrier pin that extends from one of the second side of the first carrier member and a side of the third carrier member into the other one of the second side of the first carrier member and the side of the third carrier member.

CLAIM 14 (ORIGINAL): The planet gear carrier according to claim 13 wherein the first carrier pin extends from the first side of the first carrier member, and wherein the second carrier pin extends from the second side of the first carrier member.

CLAIM 15 (PREVIOUSLY PRESENTED): A planet gear carrier for a bicycle hub transmission comprising:

a first carrier member including a first carrier member axle opening for receiving an axle therethrough, wherein the first carrier member includes:

a plurality of first planet gear openings disposed on a first side of the first carrier member for receiving a plurality of first planet gears; and

a plurality of second planet gear openings disposed on a second side of the first carrier member for receiving a plurality of second planet gears;

a separate second carrier member having a second carrier member axle opening for receiving the axle therethrough;

a separate third carrier member having a third carrier member axle opening for receiving the axle therethrough;

a first carrier pin extending from the first side of the first carrier member into a side of the second carrier member to nonrotatably couple the first carrier member to the second carrier member;

a second carrier pin extending from the second side of the first carrier member into a side of the third carrier member to nonrotatably couple the first carrier member to the third carrier member; wherein a first debris space is formed between the first carrier member and the second carrier member surrounding the first carrier pin, and wherein a second debris space is formed between the first carrier member and the third carrier member surrounding the second carrier pin.

CLAIM 16 (ORIGINAL): The planet gear carrier according to claim 15 wherein the first carrier member includes a first recess that forms the first debris space and a second recess that forms the second debris space.

CLAIM 17 (ORIGINAL): The planet gear carrier according to claim 11 further comprising:
a first pinion pin disposed in each of the plurality of first planet gear openings and supported by at least one of the first carrier member and the second carrier member;
a first planet gear rotatably supported on each first pinion pin;
a second pinion pin disposed in each of the plurality of second planet gear openings and supported by at least one of the first carrier member and the third carrier member; and
a second planet gear rotatably supported on each second pinion pin.

CLAIM 18 (ORIGINAL): The planet gear carrier according to claim 17 wherein the first pinion pin is one piece with the second pinion pin to form a master pinion pin.

CLAIM 19 (ORIGINAL): The planet gear carrier according to claim 18 wherein the master pinion pin is supported by the first carrier member, and further comprising a bushing disposed between the first carrier member and the master pinion pin for rotatably supporting the master pinion pin.

CLAIM 20 (PREVIOUSLY PRESENTED): A planet gear carrier for a bicycle hub transmission comprising:

a first carrier member including a first carrier member axle opening for receiving an axle therethrough, wherein the first carrier member includes:

a plurality of first planet gear openings disposed on a first side of the first carrier member for receiving a plurality of first planet gears; and

a plurality of second planet gear openings disposed on a second side of the first carrier member for receiving a plurality of second planet gears;
a separate second carrier member having a second carrier member axle opening for receiving the axle therethrough;
a separate third carrier member having a third carrier member axle opening for receiving the axle therethrough;
a first pinion pin disposed in each of the plurality of first planet gear openings and supported by at least one of the first carrier member and the second carrier member;
a first planet gear rotatably supported on each first pinion pin;
a second pinion pin disposed in each of the plurality of second planet gear openings and supported by at least one of the first carrier member and the third carrier member;
a second planet gear rotatably supported on each second pinion pin;
wherein the first pinion pin is one piece with the second pinion pin to form a master pinion pin; and
a stopper ring groove disposed on at least one of the first carrier member and the third carrier member for axially fixing the first pinion pin and the second pinion pin.

CLAIM 21 (ORIGINAL): The planet gear carrier according to claim 11 further comprising a fastener for fastening the first carrier member, the second carrier member and the third carrier member together.

CLAIM 22 (ORIGINAL): The planet gear carrier according to claim 21 wherein the fastener comprises a rivet that extends through the first carrier member, the second carrier member and the third carrier member.

CLAIM 23 (ORIGINAL): The planet gear carrier according to claim 11 wherein the plurality of first planet gear openings open through the first side of the first carrier member, and wherein the plurality of second planet gear openings open through the second side of the first carrier member.

CLAIM 24 (PREVIOUSLY PRESENTED): A planet gear carrier for a bicycle hub transmission comprising:

a first carrier member including a first carrier member axle opening for receiving an axle therethrough, wherein the first carrier member includes:

a plurality of first planet gear openings disposed on a first side of the first carrier member for receiving a plurality of first planet gears; and

a plurality of second planet gear openings disposed on a second side of the first carrier member for receiving a plurality of second planet gears;

a separate second carrier member having a second carrier member axle opening for receiving the axle therethrough;

a separate third carrier member having a third carrier member axle opening for receiving the axle therethrough; and

wherein the third carrier member includes a plurality of pawl receiving recesses.

CLAIM 25 (ORIGINAL): The planet gear carrier according to claim 24 wherein the plurality of pawl receiving recesses are disposed on an outer peripheral surface of the third carrier member.

CLAIM 26 (ORIGINAL): The planet gear carrier according to claim 11 wherein the first carrier member directly contacts the second carrier member and the third carrier member.

CLAIM 27 (PREVIOUSLY PRESENTED): A planet gear carrier for a bicycle hub transmission comprising:

a first carrier member including a first carrier member axle opening for receiving an axle therethrough, wherein the first carrier member includes:

a plurality of first planet gear openings disposed on a first side of the first carrier member for receiving a plurality of first planet gears; and

a plurality of second planet gear openings disposed on a second side of the first carrier member for receiving a plurality of second planet gears;

a separate second carrier member having a second carrier member axle opening for receiving the axle therethrough;

a separate third carrier member having a third carrier member axle opening for receiving the axle therethrough; and

wherein the first carrier member includes a radially inwardly extending wall for axially retaining a sun gear.

CLAIM 28 (PREVIOUSLY PRESENTED): A planet gear carrier for a bicycle hub transmission comprising:

a first carrier member including a first carrier member axle opening for receiving an axle therethrough, wherein the first carrier member includes:

a plurality of first planet gear openings disposed on a first side of the first carrier member for receiving a plurality of first planet gears; and

a plurality of second planet gear openings disposed on a second side of the first carrier member for receiving a plurality of second planet gears;

a separate second carrier member having a second carrier member axle opening for receiving the axle therethrough;

a separate third carrier member having a third carrier member axle opening for receiving the axle therethrough; and

wherein each of the plurality of first planet gear openings is larger than each of the plurality of second planet gear openings.

CLAIM 29 (ORIGINAL): The planet gear carrier according to claim 11 wherein each first planet gear opening is located directly opposite a corresponding second planet gear opening, and further comprising:

a plurality of pairs of first carrier pins for nonrotatably coupling the first carrier member to the second carrier member, wherein each pair of first carrier pins is disposed between a corresponding pair of the first planet gear openings;

a plurality of pairs of second carrier pins for nonrotatably coupling the first carrier member to the third carrier member, wherein each pair of second carrier pins is disposed between a corresponding pair of the second planet gear openings;

wherein each pair of first carrier pins is located opposite a corresponding pair of the second carrier pins;

a rivet disposed between each pair of first carrier pins and each pair of second carrier pins and extending through the first carrier member, the second carrier member and the third carrier member;

a plurality of pinion pins, each pinion pin extending through the first carrier member into a corresponding first planet gear opening and second planet gear opening;

a first planet gear rotatably supported in each first planet gear opening; and

a second planet gear rotatably supported in each second planet gear opening.

CLAIM 30 (ORIGINAL): The planet gear carrier according to claim 11 wherein the first side of the first carrier member is substantially parallel to the second side of the first carrier member.

CLAIM 31 (PREVIOUSLY PRESENTED): A planet gear carrier for a bicycle hub transmission comprising:

a first carrier member including a first carrier member axle opening for receiving an axle therethrough, wherein the first carrier member includes:

a plurality of first planet gear openings disposed on a first side of the first carrier member for receiving a plurality of first planet gears; and

a plurality of second planet gear openings disposed on a second side of the first carrier member for receiving a plurality of second planet gears;

a separate second carrier member having a second carrier member axle opening for receiving the axle therethrough; and

a separate third carrier member having a third carrier member axle opening for receiving the axle therethrough;

wherein the first carrier member includes a first guide rib that engages the second carrier member, and wherein the third carrier member includes a second guide rib that engages the first carrier member.

CLAIM 32 (ORIGINAL): The planet gear carrier according to claim 11 wherein the first carrier member is formed from a different material than at least one of the second carrier member and the third carrier member.

CLAIM 33 (ORIGINAL): The planet gear carrier according to claim 32 wherein the first carrier member is formed of a light alloy metal.

CLAIM 34 (ORIGINAL): The planet gear carrier according to claim 33 wherein the first carrier member is formed of an aluminum alloy.

CLAIM 35 (CURRENTLY AMENDED): A planet gear carrier for a bicycle hub transmission comprising:

a first carrier member including a first carrier member axle opening for receiving an axle therethrough and including a plurality of first planet gear openings for receiving a plurality of first planet gears and a first pinion pin opening at each of the plurality of first planet gear openings for mounting a first pinion pin that rotatably supports a first planet gear;

wherein the first carrier member axle opening is structured to allow the first carrier member to rotate relative to the axle;

a separate second carrier member having a second carrier member axle opening for receiving the axle therethrough;

wherein the second carrier member axle opening is structured to allow the second carrier member to rotate relative to the axle;

wherein the first carrier member is fastened to the second carrier member;

a first pinion pin disposed in each first pinion pin opening; and

a bushing disposed in each first pinion pin opening radially between each and surrounding a corresponding first pinion pin and the first carrier member.

CLAIM 36 (ORIGINAL): The planet gear carrier according to claim 1 wherein the first carrier member is formed from a different material than the second carrier member.

CLAIM 37 (ORIGINAL): The planet gear carrier according to claim 36 wherein the first carrier member is formed of a light alloy metal.

CLAIM 38 (ORIGINAL): The planet gear carrier according to claim 37 wherein the first carrier member is formed of an aluminum alloy.

CLAIM 39 (PREVIOUSLY PRESENTED): The planet gear carrier according to claim 1 wherein the first carrier member includes a guide rib that engages the second carrier member.

CLAIM 40 (CURRENTLY AMENDED): A hub transmission comprising:
a hub axle;
a driver rotatably supported to the hub axle;
a hub shell rotatably supported to the hub axle;
a planetary gear mechanism disposed between the driver and the hub shell for communicating rotational power from the driver to the hub shell through a plurality of power transmission paths, wherein the planetary gear mechanism comprises:
a first carrier member including:
a first carrier member axle opening receiving the hub axle therethrough; ~~and~~
~~including~~ a plurality of first planet gear openings for receiving a plurality of first planet gears therein and dimensioned such that each first planet gear is entirely exposed radially; and
a pinion pin opening at each of the plurality of first planet gear openings for mounting a pinion pin;
wherein the first carrier member axle opening is structured to allow the first carrier member to rotate relative to the hub axle;
a separate second carrier member having a second carrier member axle opening receiving the hub axle therethrough;
wherein the second carrier member axle opening is structured to allow the second carrier member to rotate relative to the hub axle; and
wherein the first carrier member is fastened to the second carrier member.

CLAIMS 41-42 (CANCELED).